

**REMARKS**

The following remarks are responsive to the October 5, 2006 Office Action. Claims 1, 8, 10, and 12 remain as previously presented and Claims 2-7, 9, and 11 remain as originally filed. Thus, Claims 1-12 are presented for further consideration.

**Response to Rejection of Claims 1-7, 9, and 12 Under 35 U.S.C. § 103(a)**

In the October 5, 2006 Office Action, the Examiner rejects Claims 1-7, 9, and 12 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,691,978 issued to Kenworthy ("Kenworthy") in view of U.S. Patent No. 5,861,837 issued to Richardson *et al.* ("Richardson").

**Claim 1**

As previously presented, Claim 1 recites (emphasis added):

1. A transceiver comprising:
  - a receiver receiving a signal and generating a receiver signal having a receiver bandwidth;
  - a receiver direct converter translating the receiver signal to a baseband of the receiver signal and digitizing the translated, receiver signal;
  - an adaptive canceller comprising a reference direct converter, the reference direct converter outputting a digitized transmit signal reference of a spectral energy of a transmitter, **the digitized transmit signal reference having the receiver bandwidth;** and
  - a matched filter, wherein the receiver direct converter, the reference direct converter, and the matched filter suppress the spectral energy of the transmitter from the receiver signal.

As described in the present application at paragraph [0060], referring to Figure 5A, "The transfer function  $H_{REF}(\omega)$ , of the reference bandpass filter 236 preferably matches the transfer function  $H_{RX}(\omega)$ , of the receiver bandpass filter 214." Thus, the present application teaches that in certain embodiments, the digitized transmit signal reference has the same bandwidth as the receiver bandwidth of the receiver signal. However, Applicant submits that neither Kenworthy nor Richardson discloses a "digitized transmit signal reference having the receiver bandwidth," as recited by Claim 1.

In the October 5, 2006 Office Action, the Examiner acknowledges that Kenworthy does not disclose the "digitized transmit signal reference having the receiver bandwidth." However, the Examiner cites Richardson in arguing that Richardson discloses a "digitized transmit signal reference having the receiver bandwidth." As discussed below, Applicant respectfully submits that Richardson, including the passages cited by the Examiner, does not disclose or suggest this limitation.

Richardson discloses a CW Doppler radar system which includes leakage cancellation. The system disclosed by Richardson has separate cancellation circuit loops for each frequency. In this way, Richardson discloses that each frequency is treated separately to cancel the leakage signal at each frequency.

The Examiner cites Richardson at column 4, lines 32-39 which describes a cancellation circuit loop for a single frequency (emphasis added):

**The frequency of the local oscillator 74 is the same as the transmit frequency  $F_T$  so that the cancelling signal uses the local oscillator. The frequency of the local oscillator 74 is also used to generate the transmit frequency  $F_T$ , as shown in FIG. 3, so that the cancelling signal has the same frequency as the feedthru signal that was downconverted to the receive IF.**

The Examiner interprets this passage as disclosing that “the frequency of the canceling signal has the same frequency (bandwidth) as the received downconverted IF signal.” Thus the Examiner appears to interpret frequency to be synonymous with bandwidth. However, Applicant submits that persons skilled in the art understand that the term “bandwidth” is used in the present application to refer to the range of frequencies of interest of a signal, and in particular, the term “receiver bandwidth” refers to a range of frequencies of a receive signal. Therefore, this passage of Richardson does not disclose or suggest “the digitized transmit signal reference having the receiver bandwidth,” as recited by Claim 1.

Similarly, the Examiner cites Richardson at column 4, lines 59-66, which further describes the cancellation circuit loop for a single frequency (emphasis added):

The purpose of the cancellation circuit 36 is to mix the IF signal appearing at the input 34 with the I and Q quadrature components 72 and 78 of the local oscillator signal 74 so that the leakage signal  $f_T$  is down-shifted to a DC level indicative of its strength. The Geq circuits 54 and 60 are designed to pass only the low frequency signal  $f_T$ . **The leakage signal level is then up-shifted by the mixers 56 and 62 back to the original IF frequency, the strength being in an amount proportional to the DC level.**

The Examiner interprets this passage as disclosing that the leakage cancellation signal is “upshifted (in frequency band) to the IF frequency of the received signal.” However, Applicant submits that persons skilled in the art understand that frequency is a different quantity than bandwidth, so this passage of Richardson also does not disclose or suggest the limitation of Claim 1 that is missing from Kenworthy.

Instead of cancelling transmitter signal energy in a receiver bandwidth as disclosed by the present application, Richardson describes leakage cancellation for a plurality of frequencies using a corresponding plurality of cancellation circuit loops to separately remove the leakage signal at each of the selected frequencies (*see, e.g.*, Figure 6 of Richardson and corresponding text). Although Richardson discloses that these cancellation circuit loops may comprise "an optional bandpass filter," this filter is merely used "to improve the dynamic signal handling of the loop" (Richardson at column 6, lines 37-39). In addition, Richardson describes that the circuit which generates local oscillator (LO) sources for the cancellation circuits comprises bandpass filters which pass sidebands from mixers to a 90 degree splitter to create quadrature signals at a selected frequency (Richardson at column 6, lines 49-56). Therefore, Applicant submits that Richardson does not disclose or suggest bandpass filters which result in "the digitized transmit signal reference having the receiver bandwidth," as recited by Claim 1.

For at least the foregoing reasons, Applicant submits that Claim 1 is patentably distinguished over the combination of Kenworthy in view of Richardson. Applicant respectfully requests that the Examiner withdraw the rejection and pass this claim to allowance.

Claims 2-7 and 9

Each of Claims 2-7 and 9 depends from Claim 1, so each of Claims 2-7 and 9 includes all the limitations of Claim 1, as well as other limitations of particular utility. For at least the reasons stated above with regard to Claim 1, Applicant submits that each of Claims 2-7 and 9 is patentably distinguished over the combination of Kenworthy in view of Richardson. Applicant respectfully requests that the Examiner withdraw the rejections of Claims 2-7 and 9 and pass these claims to allowance.

Claim 12

As previously presented, Claim 12 recites (emphasis added):

12. A transceiver comprising:
  - a duplexer coupled to an antenna;
  - a receiver having a receiver bandwidth, wherein the receiver receives a first signal from the duplexer, **the first signal having the receiver bandwidth;**
  - a transmitter sending a second signal to the duplexer, **the second signal having the receiver bandwidth;** and
  - an adaptive, digital, coherent spectral canceller coupled to the receiver and the transmitter, the canceller attenuating a signal spectrum leakage of the second signal within the receiver bandwidth.

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For reasons similar to those discussed above with respect to Claim 1, Applicant submits that Claim 12 includes limitations which neither Kenworthy nor Richardson disclose or suggest. For example, Applicant submits that neither Kenworthy nor Richardson discloses or suggests "the first signal having the receiver bandwidth" and "the second signal having the receiver bandwidth" as recited by Claim 12. Therefore, Applicant submits that Claim 12 is patentably distinguished over Kenworthy in view of Richardson. Applicant respectfully requests that the Examiner withdraw the rejection of Claim 12 and pass this claim to allowance.

**Response to Rejection of Claim 8 Under 35 U.S.C. § 103(a)**

In the October 5, 2006 Office Action, the Examiner rejects Claim 8 under 35 U.S.C. § 103(a) as being unpatentable over Kenworthy in view of Richardson and in further view of U.S. Patent No. 5,396,571 issued to Yedid *et al.* ("Yedid"). Applicant submits that Yedid does not disclose or suggest the limitations of Claim 1 which are not disclosed or suggested by either Kenworthy or Richardson. Therefore, Claim 1 is patentably distinguished over Kenworthy in view of Richardson and in further view of Yedid.

Claim 8 depends from Claim 1, so Claim 8 includes all the limitations of Claim 1, as well as other limitations of particular utility. Therefore, for at least the reasons stated above with regard to Claim 1, Applicant submits that Claim 8 is patentably distinguished over Kenworthy in view of Richardson and in further view of Yedid. Applicant respectfully requests that the Examiner withdraw the rejection of Claim 8 and pass this claim to allowance.

**Response to Rejection of Claims 10 and 11 Under 35 U.S.C. § 103(a)**

In the April 20, 2006 Office Action, the Examiner rejects Claims 10 and 11 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,596,439 issued to Dankberg *et al.* ("Dankberg") in view of Kenworthy and in further view of Richardson.

**Claim 10**

As previously presented, Claim 10 recites (emphasis added):

10. A method of attenuating a transmitter signal spectrum within a bandwidth of a receiver, the method comprising:

digitizing a received signal from a receiver, **the received signal having a receiver bandwidth**, the received signal corrupted by components of a transmit signal;

creating a digitized reference transmit signal of the transmit signal, **the digitized reference transmit signal having the receiver bandwidth**;

aligning the digitized reference transmit signal in amplitude, phase and time delay with the digitized received signal;

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subtracting the digitized reference transmit signal from the digitized received signal to form a residue; and  
**suppressing a transmitter spectral signal power of the residue within the receiver bandwidth.**

In the October 5, 2006 Office Action, the Examiner acknowledges that Dankberg discloses neither the limitation of "the digitized reference transmit signal having the receiver bandwidth," nor the limitation of "suppressing a transmitter spectral signal power of the residue within the receiver bandwidth." For reasons similar to those discussed above with respect to Claim 1, Applicant submits that neither Kenworthy nor Richardson discloses or suggests the limitations of Claim 10 which are not disclosed or suggested by Dankberg. Therefore, Claim 10 is patentably distinguished over Dankberg in view of Kenworthy and in further view of Richardson. Applicant respectfully requests that the Examiner withdraw the rejection of Claim 10 and pass this claim to allowance.

Claim 11

Claim 11 depends from Claim 10, so Claim 11 includes all the limitations of Claim 10, as well as other limitations of particular utility. Therefore, for the above stated reasons with regard to Claim 10, Applicant submits that Claim 11 is patentably distinguished over Dankberg in view of Kenworthy and in further view of Richardson. Applicant respectfully requests that the Examiner withdraw the rejection of Claim 11 and pass this claim to allowance.

**Summary**

For the foregoing reasons, Applicant submits that Claims 1-12 are in condition for allowance, and Applicant respectfully requests such action.

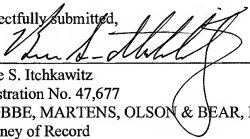
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Dated: \_\_\_\_\_

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By: \_\_\_\_\_

Respectfully submitted,

  
Bruce S. Itchkawitz  
Registration No. 47,677  
KNOBBE, MARTENS, OLSON & BEAR, LLP  
Attorney of Record  
2040 Main Street  
Fourteenth Floor  
Irvine, CA 92614  
(949) 760-0404